
CHAPTER 7

Public Involvement Programs

In the years since this manual was first developed, the world has seen ever-increasing demands for water, often from competing interests, and often in the face of declining water supplies. As a result, water quality and quantity have become important public topics in many arenas, and regulatory agencies often require some level of stakeholder involvement in water management decisions. This is strikingly different from the past when members of the public were often informed about projects only after final decisions had been made. Today, responsible leaders recognize the need to incorporate public values with science, technology, and legal aspects to create real, workable solutions tailored to meet specific needs.

In the area of water reuse, the opportunities for meaningful public involvement are many. This chapter provides an overview of the key elements of public planning, as well as several case studies illustrating public involvement and/or participation approaches.

7.1 Why Public Participation?

Public involvement or participation programs work to identify key audiences and specific community issues at a very early stage, offering information and opportunities for input in a clear, understandable way. Effective public involvement begins at the earliest planning stage and lasts through implementation and beyond.

Public participation begins with having a clear understanding of the water reuse options available to the community. Once an understanding of possible alternatives is developed, a list of stakeholders, including possible users, can be identified and early public contacts may begin. Why begin contacting stakeholders before a plan is in place? These citizen stakeholders can provide early indications regarding which reuse program will be best accepted on a community-wide level. Beyond that, informed citizens can help identify and resolve potential problems before they occur and develop alternatives that may work more effectively for the community.

In general, effective public participation programs invite two-way communication, provide education, and ask for meaningful input as the reuse program is developed and refined. Depending on the project, public involvement can involve limited contact with a number of specific users, or can be expanded to include the formation of a formal advisory committee or task force. Often, public information efforts begin by targeting the most impacted stakeholders. Over time, as an early education base is built among stakeholders, the education effort then broadens to include the public at large. Regardless of the audience, all public involvement efforts are geared to help ensure that adoption of a selected water reuse program will fulfill real user needs and generally recognized community goals including public health, safety, and program cost.

The term, “two-way communications flow” cannot be too highly emphasized. In addition to building community support for a reuse program, public participation can also provide valuable community-specific information to the reuse planners. Citizens have legitimate concerns, quite often reflecting their knowledge of detailed technical information. In reuse planning, especially, where one sector of “the public” comprises potential users of reclaimed water, this point is critical. Potential users *generally* know what flow and quality of reclaimed water are acceptable for their applications.

7.1.1 Informed Constituency

By taking time during the planning stages to meet with citizens, communities will have a much greater opportunity to develop a successful reuse program. Many citizens may have a pre-conceived notion about reclaimed water and its benefits. It is important to identify each stakeholder’s issues and to address questions and concerns in a clear, matter-of-fact way. This two-way dialogue will lead to informed input regarding reuse alternatives.

A public participation program can build, over time, an informed constituency that is comfortable with the concept of reuse, knowledgeable about the issues involved in reclamation/reuse, and supportive of program implementation. Ideally, citizens who have taken part in the planning process will be effective proponents of the selected plans. Having educated themselves on the issues involved in adopting reclamation and reuse, they will also understand how various interests have been accommodated in the final plan. Their understanding of the decision-making process will, in turn, be communicated to larger interest groups – neighborhood residents, clubs, and municipal agencies – of which they are a part. Indeed the potential reuse customer who is enthusiastic about the prospect of receiving service may become one of the most effective means of generating support for a program. This is certainly true with the urban reuse programs in St. Petersburg and Venice, Florida. In these communities, construction of distribution lines is contingent on the voluntary participation of a percentage of customers within a given area.

In other communities where reuse has not been introduced in any form, the focus may begin with very small, specific audiences. For instance, a community may work closely with golf course owners and superintendents to introduce reuse water as a resource to keep the golf course in prime condition, even at times when other water supplies are low. This small, informed constituency can then provide the community with a lead-in to other reclaimed water options in the future. Golf course superintendents spread the word informally, and, as golfers see the benefits, the earliest of education campaigns has subtly begun. Later, the same community may choose to introduce an urban system, offering reclaimed water for irrigation use.

Since many reuse programs may ultimately require a public referendum to approve a bond issue for funding reuse system capital improvements, diligently soliciting community viewpoints and addressing any concerns early in the planning process can be invaluable in garnering support. Public involvement early in the planning process, even as alternatives are beginning to be identified, allows ample time for the dissemination and acceptance of new ideas among the constituents. Public involvement can even expedite a reuse program by uncovering any opposition early enough to adequately address citizen concerns and perhaps modify the program to better fit the community.

7.2 Defining the “Public”

Many contemporary analyses of public involvement define “the public” as comprising various subsets of “pub-

lics” with differing interests, motivations, and approaches to policy issues. For example, in discussing public participation for wastewater facilities and reuse planning the following publics may be identified: general public, potential users, environmental groups, special interest groups, home owners associations, regulators and/or regulating agencies, educational institutions, political leaders, and business/academic/community leaders. In an agricultural area, there may be another different set of publics including farmers.

For example, several government agencies in California held a Reuse Summit in 1994, at which they endorsed the creation of the public outreach effort by creating the following mission statement (Sheikh *et al.*, 1996):

“To activate community support for water recycling through an outreach program of educating and informing target audiences about the values and benefits of recycled water.”

During that summit they also identified 8 public audiences: Local Elected Officials, Regulatory Agency Staff, General Public, Environmental Community, City Planning Staffs, Agricultural Community, Schools, and Newspaper Editorial Boards.

From the outset of reuse planning, informal consultation with members of each of the groups comprising “the public”, and formal presentations before them, should both support the development of a sound base of local water reuse information and, simultaneously, build a coalition that can effectively advocate reuse in the community. Keeping in mind that different groups have different interests at stake, each presentation should be tailored to the special needs and interests of the audience.

If a reuse program truly has minimal impact on the general public, limited public involvement may be appropriate. For example, use of reclaimed water for industrial cooling and processing – with no significant capital improvements required of the municipality – may require support only from regulatory, technical, and health experts, as well as representatives from the prospective user and its employees. Reuse for pastureland irrigation in isolated areas might be another example warranting only limited public participation.

7.3 Overview of Public Perceptions

One of the most tried and true methods of determining the public's perception of reuse programs is surveys. Surveys can determine whether or not there will be a large enough consumer base to sustain a program, if the pro-

gram will be favorable enough to progress to the conceptual and design stage, and the overall success of the project after implementation. The following projects highlight different survey strategies and results across the nation.

7.3.1 Residential and Commercial Reuse in Tampa, Florida

A survey done by the City of Tampa for its residential reuse project included a direct mailing and public opinion survey. Information was sent to 15,500 potable water customers in the conceptual project area. Out of the pool of potential reuse customers, 84 percent of the residential users and 94 percent of the commercial users in the South Tampa area thought that reclaimed water was safe for residential and commercial landscape irrigation. Of the same group, 84 percent of the residential responders and 90 percent of the commercial responders replied that the project was appealing. The responses met the design criteria of 90 percent participation (Grosh *et al.*, 2002).

7.3.2 A Survey of WWTP Operators and Managers

A study done by Hall and Rubin in 2002 surveyed 50 wastewater operators and managers. Seventy percent of the responders stated that they believed that reuse would be an important part of their operation in 5 years. The majority (66 percent) thought that water reuse should be considered as an element of all water and wastewater expansion facility permits. Ninety percent wanted funding agencies to consider financial incentives to encourage more water reuse. **Table 7-1** lists the survey results (in percentages) to the inquiry for potential use alternatives for reclaimed water.

7.3.3 Public Opinion in San Francisco, California

The City of San Francisco, California, surveyed the general public to measure public acceptance of a proposed reclaimed water project. **Figures 7-1** and **7-2** graphically demonstrate the responses that were collected. The overall majority strongly felt that reclaimed water was beneficial. Figure 7-2 shows that the responders felt positively about all of the proposed uses of reclaimed water: fire fighting, irrigation of golf courses and parks, street cleaning, toilet flushing, and drought protection.

7.3.4 Clark County Sanitation District Water Reclamation Opinion Surveys

Clark County (Las Vegas, Nevada) conducted a series of 4 different surveys. The surveys included a face-to-face intercept survey at the Silver Bowl Park, a direct mail survey with local residents in the Silver Bowl Park area, a direct mail survey to local residents in the Desert Breeze Park vicinity, and face-to-face intercepts with attendees of the EcoJam Earth Day Event. A total of 883 persons participated in the survey (Alpha Communications Inc., 2001).

The majority (63.8 to 90.1 percent) of the responses were very positive, replying that the "...overall benefits of reclaimed water usage are very beneficial." There was a small minority who had concerns with "...environmental safety, bacteria, or germ build-up and general health risks to children" (Alpha Communications Inc., 2001). **Figure 7-3** shows a graphical representation of the average public opinion responses from the 4 surveys regarding reuse for 4 different uses: golf course irrigation, park irrigation, industrial cooling, and decorative water features.

Another portion of the survey asked if there were any benefits of using reclaimed water at park facilities. **Table 7-1** lists the responses.

There is no question that the public's enthusiasm for reuse (as noted in the cited studies) could reflect the hypothetical conditions set up by the survey questions and interviews used rather than signify a genuine willingness to endorse local funding of real programs that involve distribution of reclaimed water for nonpotable use in their neighborhood. Survey results do indicate, however, that, at least intellectually, "the public" is receptive to use of reclaimed water in well thought out programs. The results also support conclusions that this initial acceptance hinges in large measure on:

- The public's awareness of local water supply problems and perception of reclaimed water as having a place in the overall water supply allocation scheme
- Public understanding of the quality of reclaimed water and how it would be used
- Confidence in local management of the public utilities and in local application of modern technology
- Assurance that the reuse applications being considered involve minimal risk of accidental personal exposure

Table 7-1. Positive and Negative Responses to Potential Alternatives for Reclaimed Water

Use	Yes	No
Irrigation of Athletic Fields	84	16
Irrigation of Office Parks and Business Campuses	82	18
Irrigation of Highway Right-of-way	85	15
Residential Landscape Irrigation and Maintenance	74	26
Golf Course Irrigation	89	11
Irrigation of Agricultural Crops	82	18
Irrigation of Crops for Direct Human Consumption	30	70
Vehicle Wash Water	76	24
Concrete Production	90	10
Dust Control	82	18
Stream Augmentation	67	33
Toilet Flushing	80	20
Fire Protection	84	16
Ornamental Ponds/Fountains	56	44
Street Cleaning	87	13
Industrial Process Water	78	22
Wetland Creation	84	16
Pools/Spas	15	85
Potable Reuse – Direct	18	82
Potable Reuse – Indirect	40	60

Adapted from Hall and Rubin, 2002

7.4 Involving the Public in Reuse Planning

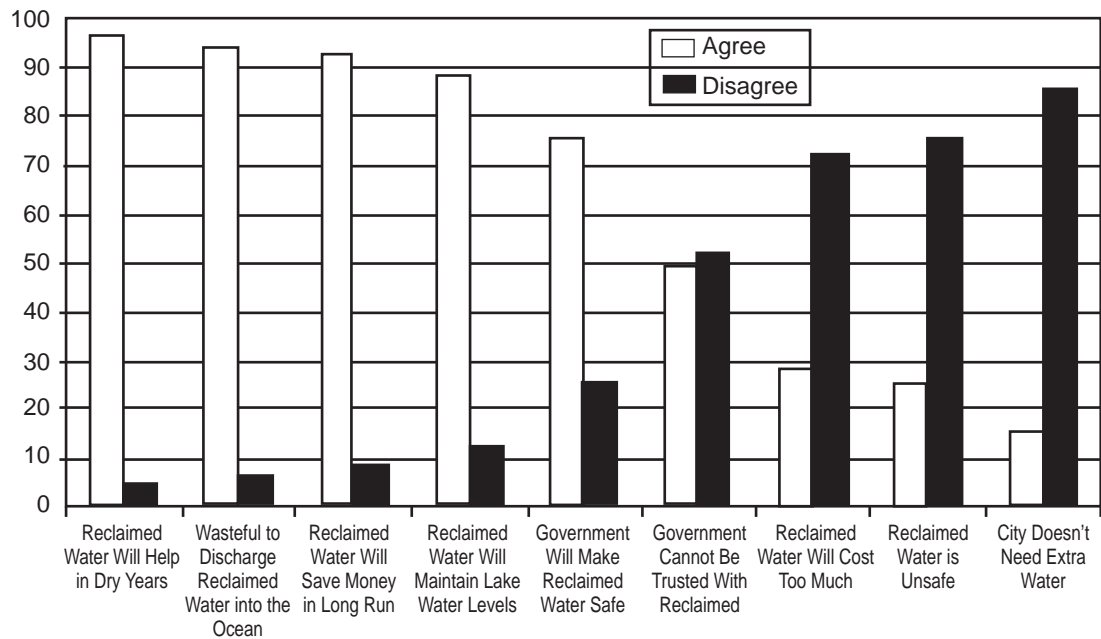
Even where water reclamation is common, there is a need to establish a flow of information to and from potential reuse customers, so that they can have a clear understanding of the program and provide input regarding their needs and concerns. Equally important is the need to address these concerns and answer any questions in a timely manner. This can help assure the public that their issues are being heard and that reuse planners are being forthcoming in their efforts.

Probably the most important step in encouraging the public acceptance is to establish and communicate the expected project benefits. If the project is intended to

extend water resources, then preliminary studies should address how much water will be made available through reclamation and compare the costs to those needed to develop other potable water sources. If reclamation costs are not competitive, then overriding non-economic issues must exist to equalize the value of the 2 sources. When reclamation is considered for environmental reasons, such as to reduce or eliminate surface water discharge, then the selected reuse alternative must also be competitive with other disposal options. Above all, the public must be aware of and understand all of the benefits.

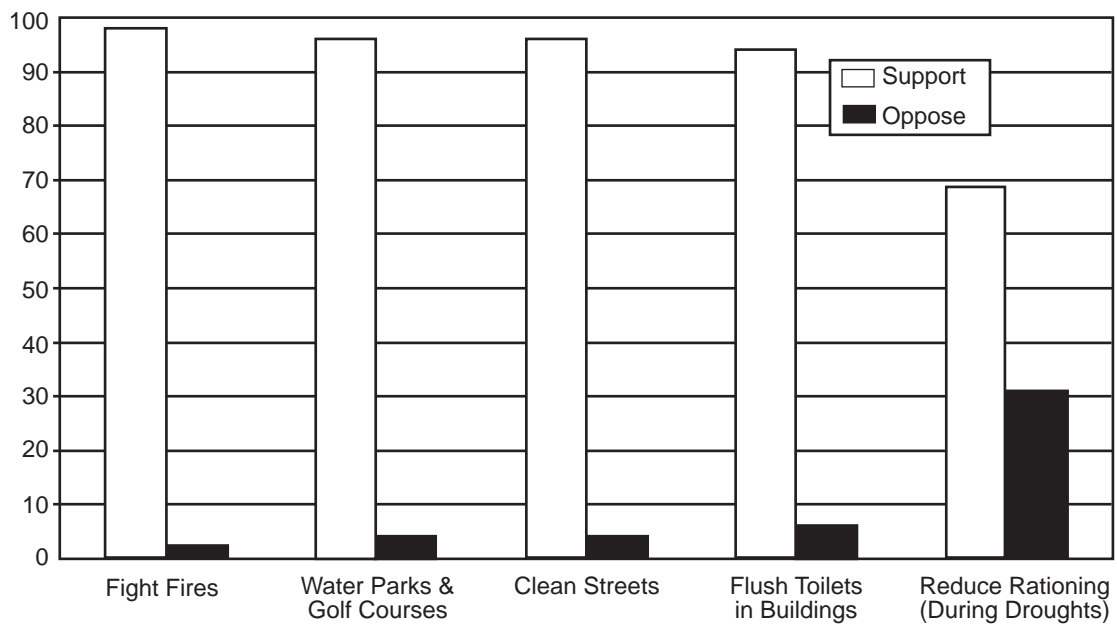
However, most potential reuse programs involve choices among systems with widely different economical and environmental impacts, which are of varying degrees of

Figure 7-1. Public Beliefs and Opinions



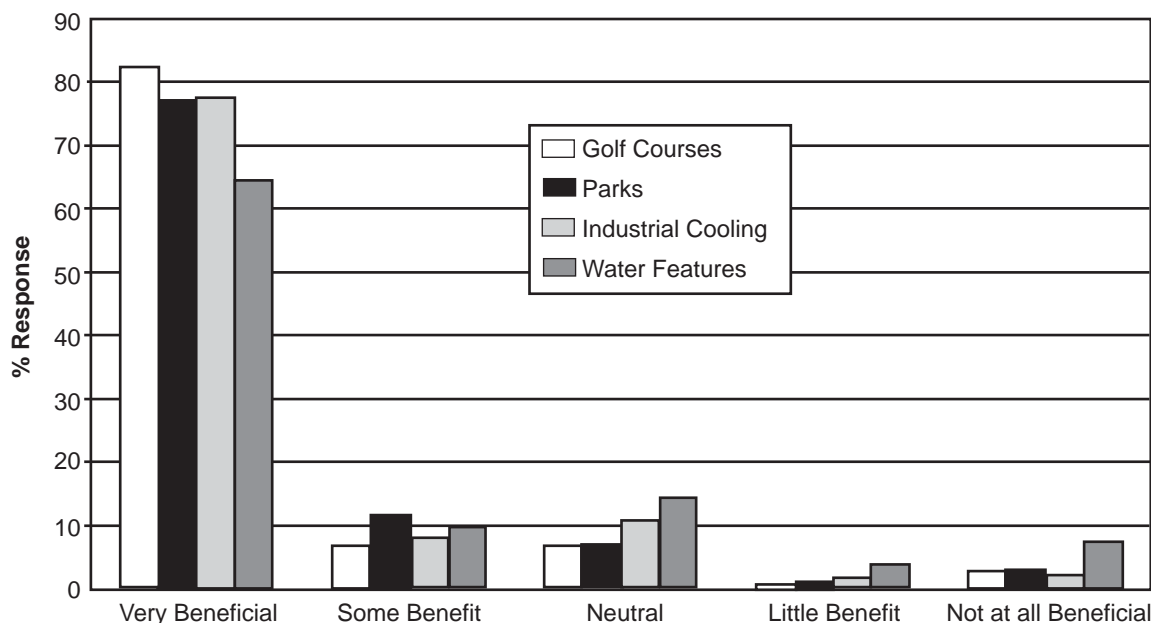
Adapted from Filice 1996

Figure 7-2. Support of Recycled Water Program Activities



Adapted from Filice 1996

Figure 7-3. Survey Results for Different Reuse



Data Source: Alpha Communications 2001

importance to many segments of the public. That is why development of the expected project benefits is so important because once they are firmly established, they become the plants of a public information program – the “why” the program is necessary and desirable. Without such validation, reclamation programs will be unable to withstand public scrutiny and the likelihood of project failure increases. In addition, only after the “why” is established can the “who” and “how” in public involvement truly be determined.

7.4.1 General Requirements for Public Participation

Figure 7-4 provides a flow chart of a public participation program for water reuse system planning.

The following items suggest an example approach that a community might consider in developing a reuse program. Note that information tools will vary depending upon how broad or involved an information program is needed.

- Determine, internally, the community’s reuse goals and the associated options and/or alternatives to be further considered.
- Identify any scientific/technical facts that exist, or are needed, to help explain the issues and alterna-

tives. If additional facts or studies are needed, consider beginning them in the earliest stages so that additional scientific data can be made available later in the process. Unanswered questions can damage the credibility of the program effort.

- Create a master list of stakeholders, including agencies, departments, elected officials, potential customers, and others who will be impacted in some way. It might be helpful to identify the level of interest different individuals and groups will have in the reuse planning process.
- Begin public outreach to specific target audiences in the form of informal meetings involving direct contact, limiting the number invited at any one time so that individual discussion is more easily accomplished
- Determine whether a task force or advisory committee is needed. If so, take steps to formally advertise and be sure to include representatives from the target audience groups. Plan a schedule and target date for reaching consensus on reuse alternatives; then plan well-prepared meetings that invite two-way communications. Bring in outside experts, such as scientists, to answer questions when needed.

Figure 7-4. Public Participation Program for Water Reuse System Planning

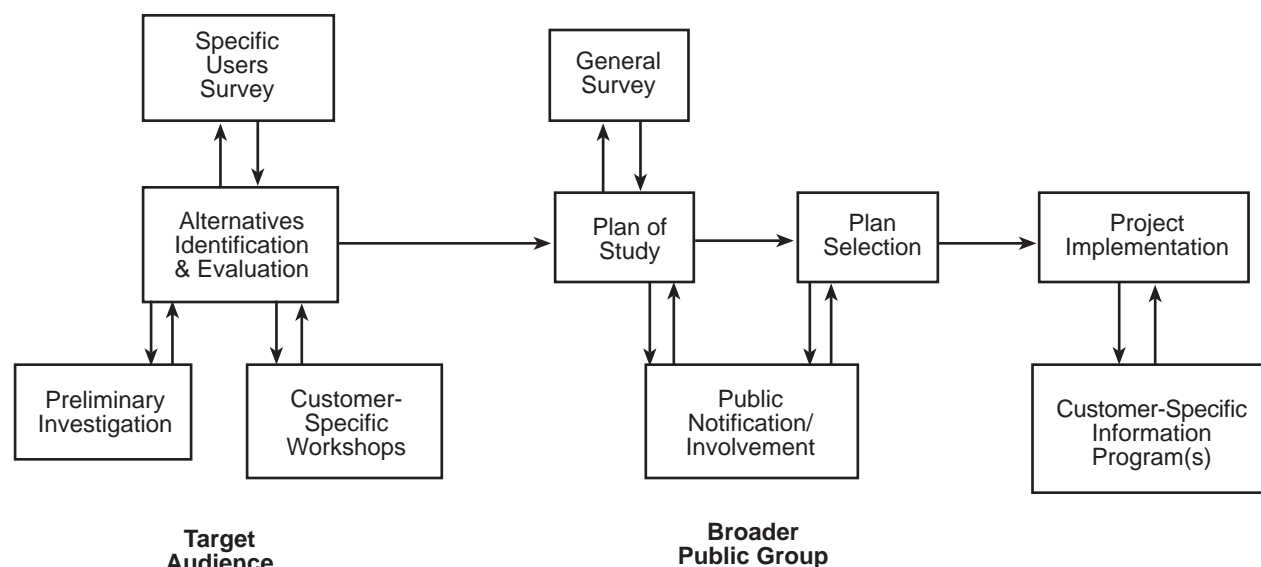


Table 7-2. Survey Results for Different Reuse

Purpose	Tools
Communitywide Education/Information	News media, editorial boards, program web site, traveling exhibits, brochures, educational videos, school programs, open houses
Direct Stakeholder or Citizen Contact	Neighborhood meetings, speeches and presentations to citizen/stakeholder groups, direct mail letters and surveys, program “hotlines” for answering information or managing construction complaints
Formalized Process	Public workshops, public meetings, presentations to elected bodies, public hearings, advisory committees, special task forces

From the task force or advisory committee, the community should be able to identify public issues that need further attention, and determine which additional public information tools will be needed. **Table 7-2** outlines a number of public information tools that can be used in the public participation process.

Once the issues are identified and public reaction is anticipated, the following tools may be useful in conveying information to the broader public:

- **Citizen survey.** Can be conducted via direct mail or telephone and might be accompanied by media releases to help increase the number of surveys returned or calls answered. In the early stages, a gen-

eral distribution survey may be helpful in identifying level of interest, potential customers, and any initial concerns that the population might have. Where specific concerns are identified, later public information efforts can be tailored to address them. These tailored efforts could include participation by other public agencies that can provide information on water reuse and regulatory requirements, informal discussions with some potential users to determine interest or fill data gaps, and initial background reports to appropriate local decision-making bodies.

- As the program progresses to alternative identification and evaluation, another survey might be considered. This survey could help confirm earlier re-

sults, monitor the effectiveness of the ongoing education program, or target specific users. Note that the percentage of citizens who take the time to participate in a survey varies widely from one community to another. This should not be the only tool relied upon in gathering input.

- Open houses. Advertise periodic public open houses where information is made available and knowledgeable people are on hand to answer questions. Maps, displays, and brief slide demonstrations are all useful open house tools.
- Program website. Increasingly, citizens are turning to websites as important information sources. Such a website can be purely informational or it can invite citizens to ask questions. The website should be updated on a regular basis and can include: its own survey or results of a citizen survey, answers to frequently asked questions, information regarding other successful programs in nearby communities, or a slideshow-style presentation that outlines the program goals and alternatives being considered.
- Media relations. In addition to project news releases, it can be very helpful to spend extra time with reporters who will be covering the topic on a regular basis, providing added background data, plant tours, and informal updates at appropriate times. This helps to provide accurate, balanced reports. The media can also be helpful in making survey data known, and in posting maps of construction areas once program implementation is underway.
- Direct mail updates or occasional newspaper inserts. These updates allow the community to address questions or issues - not relying specifically on a media report.
- Briefings for government officials. Because water reclamation programs often end up with a vote by a city council, county commission, or other elected body, it is vital that each elected official be well-informed throughout the reuse planning process. Therefore, informal briefings for individual officials can be an invaluable tool. These briefings are often conducted prior to public workshops and formal votes, and allow questions to be answered in advance of a larger, public setting.
- Plant or project tours. During the education process, a tour of an existing project that is similar to the one proposed can be an especially useful tool in providing information to key stakeholders, such as an advisory committee, elected body, or the media.

Once a reuse program has been determined, additional public information efforts will be needed throughout the implementation phase, including notification to citizens prior to construction occurring near their home or business. Then, as the reuse program goes on-line, additional media relations and direct mailings will be needed. In the case of urban reuse, this will include information to help homeowners through the connection process.

The City of Tampa's residential reclaimed water project (Florida) is one example of a successful comprehensive public participation program. The City used the services of Roberts Communication to conduct a targeted public education program, which included the following elements (Grosh *et al.*, 2002):

- Opinion leader interviews
- Public opinion survey
- Speakers bureau
- Direct mail to potential customers
- Newsletter article for homeowner association newsletters

7.4.1.1 Public Advisory Groups or Task Forces

If the scope or potential scope of the reuse program warrants (e.g., reclaimed water may be distributed to several users or types of users, or for a more controversial use), a public advisory group or task force can be formed to assist in defining system features and resolving problem areas. In its regulations for full-scale public participation programs, EPA requires that such group membership contain "substantially equivalent" representation from the private (non-interested), organized, representative, and affected segments of the public. It is recommended that, for reuse planning, group membership provide representation from potential users and their employees, interest groups, neighborhood residents, other public agencies, and citizens with specialized expertise in areas (such as public health) that pertain directly to reclamation/reuse.

The advantage of an advisory group or task force is that it offers an opportunity to truly educate a core group that may later become unofficial "spokespersons" for the project. For such a group to be successful, members must see that their input is being put to meaningful use. Depending upon the community need, either an advisory committee or task force may be appropriate. Advisory committees are generally formed for an indeterminate period to continuously provide input regard-

ing issues related to the topic. So, if an advisory committee is formed for reuse water, the committee may be kept as a recommending body to city council, county commission, or other elected body, regarding all future reclaimed water projects or issues. Often, members of the advisory group are designated to serve 2-year terms. With the development of a task force, the objectives are clearly defined and the task force disbands once the objectives have been met. Often, a task force can be a better short-term solution.

Whether a community chooses a task force or advisory committee, it is very important to take steps to institutionalize the group and its activities so that its efforts are formally recognized as meaningful by the elected body. This group can effectively focus on the task at hand—planning and implementation of a reuse program in which the legitimate interests of various sectors of the public have been fully considered and addressed. In order to achieve this, the proposed formation of the advisory group or task force should be publicized to solicit recommendations for, and expression of interest in, membership. Often, the community and its leadership will be aware of candidates who would be ideal to fulfill this role.

Whether a short-lived task force or a longer-term advisory committee, the group's responsibilities should be well-defined. Its meetings should be open to the public at times and places announced in advance. Interpretive meeting minutes should be kept and made available to the public. During an initial meeting, the group's members should designate a single individual who can serve as a contact point for the news media. The group should fully recognize its shared responsibility for developing a sound reuse program that can serve both user requirements and community objectives. In subsequent public meetings, the group will assert its combined role as a source of information representing numerous interests, and an advocate of the reuse program as it gains definition.

7.4.1.2 Public Participation Coordinator

EPA regulations for full-scale public participation programs require appointment of a public participation coordinator – an individual skilled in developing, publicizing, and conducting informal briefings and work sessions as well as formal presentations for various community groups. The appointment of a public participation coordinator helps ensure that one accurate source of information is available, and that individuals who show interest are given an opportunity to provide meaningful input. Such a person, whether an agency staff member, advisory group member or specialist engaged from the

larger community, should be thoroughly informed of the reuse planning process, be objective in presenting information, and have the 'clout' necessary to communicate and get fast response on issues or problems raised by citizens involved in the process.

To accomplish this goal, many communities involved in urban and agricultural reuse have created a dedicated reuse coordinator position. The responsibilities of such a position will vary according to specific conditions and preferences of a given municipality. In many programs, the reuse coordinator is part of the wastewater treatment department. However, the position can be associated with the water system, or independent of either utility.

7.4.2 Specific Customer Needs

As alternatives for water reuse are being considered, the customers associated with each alternative should be clearly identified, and then the needs of these customers must be ascertained and addressed. In the past, failure to take this step has resulted in costly and disruptive delays to reclamation projects. Early involvement of citizen stakeholders is a key to program success and is based on tailoring a program to the specific user type and type of reuse system.

7.4.2.1 Urban Systems

In urban reuse programs, the customer base may consist of literally thousands of individuals who may be reached through the local media, publicly advertised workshops, open houses, or neighborhood meetings. Identification of homeowner associations and civic organizations may allow for presentations to a larger number of potential customers at a single time.

The Monterey Regional Water Pollution Control Agency (MRWPCA) is one example of a public information program that reaches a large urban audience. It has an active school education program with classroom demonstrations to about 2,300 children each year. Booths at the County Fair and other local events reach another 7,500 people. Speeches to civic and service groups reach another 900 people. Together with the 800 people who tour the water reclamation plant each year, 5 percent of the service area population is being educated each year. Bimonthly billing inserts add to the local understanding and appreciation of water reclamation.

7.4.2.2 Agricultural Systems

In agricultural reuse programs, the issues of concern may differ from those of the urban customer. In such pro-

grams, the user is concerned with the suitability of the reclaimed water for the intended crop. Water quality issues that are of minor importance in residential irrigation may be of significant importance for agricultural production. For example, nitrogen in reclaimed water is generally considered a benefit in turf and landscape irrigation. However, as noted in the Sonoma Case Study in Chapter 3, the nitrogen in agricultural reclaimed water could result in excessive foliage growth at the expense of fruit production. Similarly, while turf grass and many ornamental plants may not be harmed by elevated chlorides, the same chloride levels may delay crop maturation and affect the product marketability, as occurred in the strawberry irrigation study for the Irvine Ranch Water District discussed in Section 3.4.

For these reasons and others, it is necessary to modify the public participation approach used for the urban customer when developing an agricultural program. Agencies traditionally associated with agricultural activities can provide an invaluable source of technical information and means of transmitting information to the potential user. Local agricultural extension agents may prove to be the most important constituency to communicate as to the benefits of reclamation to the agricultural community. The agents will likely know most, if not all, of the major agricultural sites in the area. In addition, they will be familiar with the critical water quality and quantity issues facing the local agricultural market. Finally, the local farmers usually see the extension office as a reliable source of information and are likely to seek their opinion on issues of concern, as might be the case with new reclamation projects. The local extension agent will be able to discuss the issues with local farmers and hopefully endorse the project if they are familiar with the concept of reuse. The local soils conservation service may also prove an important target of a preliminary information program. Lack of endorsement from these agencies can hinder the implementation of agricultural reclamation.

7.4.2.3 Reclaimed Water for Potable Purposes

While “reuse” of water has occurred naturally over the ages, the concept of treating wastewater to a level that is acceptable for drinking is the most difficult type of water reuse to gain public acceptance. In such cases public health and safety issues are of utmost importance and citizen questions will need to be fully addressed. Therefore, a comprehensive public participation effort will be required, initially focusing on the water problems to be addressed, and then turning to a thorough look at possible solutions.

Regulatory agencies, health departments, and other health and safety-related groups will be key audiences throughout the process. These are groups the public turns to for answers; therefore, it is very important to develop strong working relationships. Representatives from local agencies are also most likely to understand the issues that need to be addressed and can provide meaningful input regarding reuse options. Endorsement from these agencies is critical to program acceptance by the public.

7.4.3 Agency Communication

As noted in Chapters 4 and 5, the implementation of wastewater reclamation projects may be subject to review and approval by numerous state and local regulatory agencies. In locations where such projects are common, the procedures for agency review may be well-established. Where reclamation is just starting, formal review procedures may not exist. In either case, establishing communication with these agencies early in the project is as important as addressing the needs of the potential customers. Early meetings may serve as an introduction or may involve detailed discussions of the permitability of a given project. As with all other types of stakeholders, the proposed project must be understood and endorsed by the permitting agencies.

It may also be appropriate to contact other agencies that may still become involved with a public education program. In fact, early coordination with key agencies, such as a community health department, is an important consideration for a couple of reasons. First, the agency may not be well-informed about the community’s reuse goals. Early discussions can help to answer questions and identify issues at a time when the issues can most easily be addressed. Second, because the public often turns to these agencies for information, early meetings will help to ensure that citizens receive accurate, consistent answers. If a citizen were to ask one agency a question and receive a different answer than the community representative gave, credibility of the program can be undermined.

Where multiple departments in the same agency are involved, direct communication with all concerned departments will ensure coordination. It is worthwhile to establish a master list of the appropriate agencies and departments that will be copied on status reports and periodically asked to attend review meetings. And while this communication will be beneficial in developing any reclamation project, it will be critical when specific regulatory guidance on a proposed project does not exist. Such a condition is most likely to occur in states lacking detailed regulations or in states with very restrictive regulations that discourage reuse projects.

7.4.4 Public Information Through Implementation

No matter the type of reclaimed water project, some level of construction will be involved at the implementation stage. Citizens who may not have had an opinion prior to construction could become negative if the process does not go smoothly. This can be especially challenging in urban reuse programs when citizen “disruptions” are more visible. Whenever possible, minimal disruption to sidewalks and driveways should be planned, along with a speedy restoration effort. It will be worthwhile for the community to have a formal construction complaint process in place that offers one phone number to call regarding problems, and a tracking system that documents how quickly complaints are resolved. Public information regarding construction activities can be made available through the local media. The community will also need an information program regarding connections to the system, with emphasis on making the process as simple as possible for each customer.

7.4.5 Promoting Successes

In communities where the use of reclaimed water is new, short-term project successes can become a strong selling point for later, larger programs. Such is the case with communities that may begin an urban program by using reclaimed water in highly visible public medians. Citizens who drive pass these medians are likely to note improvements over time and see “reclaimed water” signs posted at the site. Over time, as a reuse program becomes more established, the public information specialists will need to look for other opportunities to talk about how the program is helping the community. These follow-up information efforts provide an important role in making reuse water a long-term solution for the community.

Reclaimed water has been actively and successfully used in urban applications for more than 30 years. These long-term successes have helped to encourage more and more communities to make use of this resource. As citizens have grown to accept and embrace the use of reclaimed water, a new need for education has arisen because the supply of reclaimed water is limited and should not be wastefully used any more than potable water should not be over-used. The problem of reclaimed water over-use seems to be especially true in communities that do not have metering systems to track the specific amount of water used. Metering systems, and a sliding scale for payment according to the amount used, are examples of approaches that some communities use to encourage conservative use of the reclaimed water. In Cape Coral, Florida, where urban re-

use has been in place for more than 10 years, the City launched an education campaign gently reminding citizens to conserve.

7.5 Case Studies

7.5.1 Accepting Produce Grown with Reclaimed Water: Monterey, California

For many years some vegetables and fruits have been grown in foreign countries with reclaimed water and then sold in the U.S. This practice suggests acceptance on the part of the distributors and consumers. In Orange County, California, the Irvine Company has been furrow irrigating broccoli, celery, and sweet corn with reclaimed water for over 20 years.

In 1983, as part of the Monterey Wastewater Reclamation Study for Agriculture (see description in Section 3.8), individuals involved with produce distribution were interviewed regarding the use of reclaimed water for vegetable irrigation. One hundred and forty-four interviews were conducted with:

- Brokers and receivers at terminal markets throughout the U.S. and Canada
- Buyers for major cooperative wholesalers in principal cities
- Buyers, merchandisers, and store managers with small, medium, and large chains

The primary focus of the interviews was the need or desire to label produce grown with reclaimed water. The results are given in **Table 7-3**.

The responses indicated the product would be accepted, and that labels would not be considered necessary. According to federal, state, and local agency staff, the source of the water used for irrigation was not subject to labeling requirements. Produce trade members indicated labeling would only be desirable if it added value to the product. Buyers stated that good appearance of the product was foremost. An abbreviated update of the 1983 survey was conducted in 1995 and led to these same conclusions.

Since 1998, the Monterey Regional Water Pollution Control Agency (MRWPCA) has been providing reclaimed water for nearly 12,000 acres (4,900 hectares) of vegetables and strawberries. Growers, especially those with a world known brand, are reluctant to advertise the source of water used on their crops. They believe the water is as

Table 7-3. Trade Reactions and Expectations Regarding Produce Grown with Reclaimed Water

Reaction or Expectation	Respondents Knowledgeable About Reclaimed Water	Respondents Not Aware of Reclaimed Water
Would Carry	64%	50%
Would Not Carry	20%	25%
Don't Know	16%	25%
TOTAL	100%	100%
Would Not Expect it to be Labeled	68%	67%
Would Expect it to be Labeled	20%	25%
Don't Know	12%	8%
TOTAL	100%	100%

Total Number of Respondents=68

Source: Monterey Regional Water Pollution Control Agency, 2002

good as or better than other irrigation water but are concerned with perception issues. Consequently, 3 approaches are being followed to address these concerns: operating the treatment plant beyond the regulatory requirements, low profile education of local residents, and planning for real or perceived problems with the produce.

MRWPCA strives to meet Title 22 requirements (<2 NTU, >5 ppm chlorine residual, <23 MPN max.) when the water enters the distribution system. This is usually 1 day after being held in an open storage pond following treatment. During the peak growing season, chlorine residual is maintained in the water until it is applied to the crops. The storage pond is sampled for fecal coliform, emerging pathogens, *Clostridium*, and priority pollutants. All the results are shared with the growers via the MRWPCA's website (www.mrwPCA.org) and through monthly grower meetings.

MRWPCA has an active school education program with classroom demonstrations to about 2,300 children each year. Booths at the county fair and other local events reach another 7,500 people. Speeches to civic and service groups reach another 900. Along with 800 people coming to tour the water reclamation plant each year, 5 percent of the service area population is being educated each year. Bimonthly billing inserts add to the local understanding and appreciation of water reclamation.

The Water Quality and Operations Committee is a group consisting of project growers, the county health department, and the reclaimed water purveyors. It meets monthly and decides policy issues for the project. That group hired a public relations firm to plan for a crisis, and a crisis communication manual was prepared. The committee is

editing the manual, continuing to prepare for different possible scenarios, and preparing to train members on how to deal with the press. The growers are still concerned about perception issues, but are confident that they have prepared for most possibilities.

7.5.2 Water Independence in Cape Coral - An Implementation Update in 2003

The City of Cape Coral, Florida, is one of the fastest growing communities in the country. At 33 years old, this southwest Florida community has a year-round population of more than 113,000 people. However, like many Florida communities, the population fluctuates with more than 18,000 additional residents in the winter months. What makes the City truly unique is its vast developer-planned canal system, with platted lots throughout the community. City planners knew well in advance that they would eventually need to supply water to more than 400,000 residents.

Water supply concerns, coupled with a need to find an acceptable method for ultimately disposing of 42 mgd of wastewater effluent, prompted the City to develop a program called, "Water Independence in Cape Coral" (WICC). WICC includes a unique dual-water system designed to provide potable water through one set of pipes and secondary, irrigation water through a second set of pipes. This secondary water would be provided through reclaimed water and freshwater canals.

Implementation of WICC did not come easy. The WICC master plan was prepared, presented, and adopted by the City with relatively little interest from the public. However, when attempts were made to move forward with

Phase 1 (issuance of special property assessment notices), some members of the public became very vocal and were successful in delaying the project. From the time the City committed to proceed, it took 6.5 years to start up Phase 1. **Table 7-4** lists the chronology of the WICC implementation and highlights the challenges faced by the City in moving forward.

The City began using the secondary water system in 1992. Had a public awareness campaign been launched in the early years, it could have addressed citizen concerns prior to finalizing the special assessment program. Cape Coral's experience provides a valuable lesson to other communities introducing reuse water.

During the first 8 years of using secondary water, Cape Coral was able to conserve more than 4 billion gallons (15 million m³) of potable water that would previously have been used for irrigation purposes. The system works by pumping reclaimed water from storage tanks to the distribution system. Five canal pump stations transfer surface water from freshwater canals, as needed. Variable speed effluent pumps respond to varying customer de-

mands. The secondary water is treated and filtered before going into the distribution system.

In 2002, the City successfully used secondary water to irrigate more than 15 miles (24 km) of landscaped medians. Other benefits have included the availability of year round irrigation at a reasonable price to customers, the deferred expansion of a City wellfield, the deferred construction of a second reverse osmosis water treatment facility by a number of years, and nearly zero discharge of effluent into the nearby Caloosahatchee River.

As Cape Coral residents came to accept secondary water as an irrigation source, the City found a need to launch an entirely different kind of education campaign. In response to "over-watering" by some customers and concerns by regulatory agencies, the City began to enforce limited watering days and times, just as with potable water. The City's new education campaign underscored the message that secondary water should be recognized as a resource, not a "disposal issue." The City created a friendly "Cape Coral Irrigator," using a smiling alligator,

Table 7-4. Chronology of WICC Implementation

November 1985	City WICC report prepared WICC concept is born
January 1988	WICC master plan adopted
April 1988	Assessment hearing with 1,200 vocal citizens WICC program stopped
November 9, 1988	City Council election Pro-WICC/Anti-WICC campaign Low voter turnout/Anti-WICC prevailed
November 1988 - October 1989	Deadlocked City Council State water management threatens potable allocation cutback Supportive rate study Supportive citizen's review committee Requested increase to potable water allocation denied
November 1989	WICC referendum 60% voter turnout WICC wins 2-to-1
December 1989	Second assessment hearing
February 1990	Construction started for Phase I
March 1992	Phase 1 starts up
September 1992	Phase 2 start up is scheduled
October 1994	Phase 3 start up is scheduled

to remind homeowners about dry season watering times and good conservation practices. The City also created an Irrigator Hotline for people to call to confirm watering schedules, and the City's Code Enforcement began issuing citations to violators to make the message clear.

As Cape Coral continues to grow, the City is looking to expand its secondary system at the same time that crews bring water and sewer service to new areas of this 114-square-mile (295-km²) community. In another creative endeavor, the City is working to increase the supply of secondary water through weir improvements by seasonally raising weirs to store more water in the canals. These weir improvements may make it possible to supply secondary water to an even larger customer base. Cape Coral has one of the largest, fully integrated water management systems in the country and will bear watching in the future.

7.5.3 Learning Important Lessons When Projects Do Not Go as Planned

Over the last decade, reclaimed water proponents have been highly successful in convincing the public about the benefits of reclaimed water for irrigation. That "hurdle" has, for the most part, been surpassed. But public questions and concerns continue to emerge about using reclaimed water for anything related to potable supplies. Today, science and technology make it possible to treat reclaimed water to drinking water standards. But, even as an indirect water supply source, case studies continue to find hesitation by citizens to embrace highly treated reclaimed water as a potable water source. This is especially true when other water supply options become available. Over time, and as more successes in the potable reclaimed water arena are achieved, this hurdle may also be surpassed.

The following 2 case studies illustrate some of the challenges that can emerge as programs strive to move forward from the conceptual stage.

7.5.3.1 San Diego, California

In 1993, the City of San Diego began exploring the feasibility of using highly treated wastewater, or reclaimed water, to augment imported water supplies. The concept of this "Water Repurification Project" was to treat reclaimed water to an even higher standard and then pipe it into a surface water reservoir. There, the reclaimed water would blend with the raw water supply, thus increasing the water supply available.

Some positive public involvement efforts undertaken by the Water Repurification Project team included:

- Convening a public advisory committee early in the project's development, which included a broad cross section of community interests
- Engaging members of the advisory committee and others, including the Sierra Club, County Medical Society, and Chamber of Commerce, to speak on behalf of the project
- Developing easy-to-understand information materials and disseminating them widely to potential stakeholders
- Making presentations to community groups and held numerous workshops and open houses
- Taking members of the public and key stakeholders on tours of the pilot plant where taste tests were held using repurified water
- Briefing policy-makers and their staffs

While the project team worked to educate and involve stakeholders in the process from the early planning stages, the following "outside" factors emerged and may have influenced public perception:

- Once the project moved from concept to design, the City of San Diego's wastewater department took over as the lead agency. This may have served to portray the project as a wastewater disposal solution rather than a water supply solution.
- *Lesson to consider:* If possible, stay with the same project team, especially leadership, from inception through completion. Keep the project goal clear and unchanging. Try to avoid sending mixed messages.
- During the 5 years from concept to design, another water supply alternative emerged. Proponents of an agricultural water transfer positioned it as a superior alternative to indirect potable reuse and launched an aggressive promotional campaign. In fact, the 2 projects were complementary, one providing a new source of imported water, the other a locally controlled water source.

Lesson to consider: If a new alternative is proposed in a public forum, it needs to be formally recognized and evaluated before the original or an enhanced concept can move forward. Otherwise, the credibility of the original concept may be harmed. In some instances, ideas can be blended through public involvement to develop a more tailored community solution. The goal is to partner with others wherever

possible and to avoid an “us versus them” environment.

- The time when the project was ready for final approval from the San Diego City Council coincided with several competitive elections. The project became a political issue. Key votes were delayed until after the election.

Lesson to consider: Much time is often dedicated to educating community leaders about a project. Elections can disrupt the timing of implementation because added time is then needed to educate new leaders. When possible, big picture planning should consider key election dates, timing project deadlines and approvals prior to any major shifts on a council or commission.

- A State Assembly member running for re-election called for special state hearings on the project, providing a forum for the candidate’s allies to attack the project. The same candidate sent a direct-mail “survey” to constituents asking if they supported “drinking sewage.” An underdog City Council candidate raised the issue of environmental justice by stating, inaccurately, that while the wastewater source was the affluent part of the city, the water recipients were in lower economic and ethnically diverse neighborhoods. Even though this was not true, the misinformation spread with the help of local radio talk show personalities and African-American activists. Several African-American ministers appeared at City Council hearings to protest politicians “using them as guinea pigs.”

Lesson to consider: If the public hears a particular “fact” as little as 3 times, then, regardless of whether or not the information is true, this “fact” will begin to be perceived as truth. This is why it is so important to correct inaccuracies whenever possible, as quickly as possible. If, for instance, a newspaper article provides incorrect facts about a project and no one calls the reporter to correct the story, then the report is filed in the newspaper archives as factual. The next time a story is needed about the project, a different reporter then uses the previous story for background information. This article is very likely to repeat the wrong information.

- Even after briefings, the lead editorial writer for water issues at *The San Diego Union-Tribune* felt any kind of water reuse was too costly and ill advised. News reporters borrowed the “Toilet to Tap” description (used by media covering a groundwater project in Los Angeles) in their ongoing coverage.

Lesson to Consider: Developing ongoing relationships with knowledgeable reporters and editorial boards is critical.

- The National Research Council issued a report on indirect potable reuse just prior to the project’s consideration by the San Diego City Council. While the report was largely favorable, the executive summary included a statement that indirect potable reuse should be considered an “option of last resort.” That comment made national news and was viewed as scientific validation that the project was unsafe.

- Spurred by local media coverage and direct mail from political candidates criticizing the project, a group of County residents formed to actively oppose the project. The “Revolting Grandmas” attended all hearings and public meetings to speak against the project and wrote letters to the media and elected officials. Members of the Revolting Grandmas lived outside the City’s jurisdiction and, therefore, had not been included on project mailing lists to receive accurate information for the past 5 years.

Lesson to Consider: While it may be impossible to identify every stakeholder group in the process, this situation highlights just how critical early identification of a complete list of stakeholders can be.

- A private developer of gray water systems attacked the project repeatedly with elected officials and the media, claiming gray water was a superior water supply option. The company president argued gray water was safer and more cost-effective than indirect potable reuse.

Lesson to Consider: Sometimes, providing a direct response to a party with an opposing view can be the correct response. But, at other times, providing a response may serve to validate the other person’s claims in the eyes of the public. It is important to evaluate the level of response needed on a case-by-case basis.

7.5.3.2 Public Outreach May not be Enough: Tampa, Florida

In the late 1990s, the City of Tampa, Tampa Bay Water, and the SWFWMD, in cooperation with the EPA, studied the feasibility of developing a water purification project for the area. Reclaimed water, treated further at a supplemental water reclamation treatment facility, would be blended with surface water and treated again at the City’s water treatment facility. A public outreach program was

developed to enhance and improve the public's understanding of the region's water problem, its long history of conflict over water issues, and public perceptions about government and indirect potable reuse. While there were significant challenges to overcome, a public information program began to make headway through the use of the following efforts:

- Identified and interviewed key stakeholders, conducted focus groups, and conducted a public opinion survey
- Developed project fact sheets, frequently asked questions materials, and brochures
- Drafted a comprehensive communication plan for the project
- Formed a public working committee and developed its operating framework
- Developed a project video, website, and layperson's guide to the Independent Advisory Committee's recommendations.
- Supported the Ecosystem Team Permitting process that resulted in permit issuance
- Conducted public meetings, open houses, and workshops

Although the outreach program reached a broad audience and the project was permitted, it has yet to be implemented. Several factors contributed to the lack of implementation, including a lack of support among agency policymakers and senior staff. Specific examples include:

- Policymakers viewed the project as a choice among seawater desalination, creating a new reservoir in an old phosphate pit, and developing the purified water project. Many policymakers considered desalination the preferred option.
- The City of Tampa Department of Sanitary Sewers was the main project proponent, positioning the project from the wastewater side. The City of Tampa Water Department was not actively involved.
- A general manager of a local water agency vocally opposed the project. Tampa Bay Water, the region's water agency, did not speak out to counter the opposition.

- A National Research Council report critical of indirect potable reuse was released just prior to when the Tampa Bay Water Board was called upon to approve the project. The report created a perception that the scientific community was not in favor of indirect potable reuse.

The Tampa project shows the importance of gaining support of policymakers, senior staff and elected officials. It may be worthwhile to consider these among the first target audiences, before working toward a broader public involvement effort.

7.5.4 Pinellas County, Florida Adds Reclaimed Water to Three R's of Education

When Pinellas County Utilities renovated the South Cross Bayou Water Reclamation Facility, the department saw an opportunity to use the new facility as a learning laboratory to teach "real-life" science to students and other County residents. The effort to make the vision a reality began more than a year ago with the construction of an Educational/Welcome Center that is now home to a multifaceted, hands-on educational program.

Initially focusing on high school science students and adult visitors, utility officials worked closely with County high school teachers to develop "Discover a Cleaner Tomorrow" as an appropriate curriculum to enhance classroom learning. The curriculum was designed to support National Science Standards, Sunshine State Standards, and student preparedness for the Florida Comprehensive Assessment Test (FCAT) tests. Through a partnership with the Pinellas County School Board, a certified science educator modifies the curriculum for each visiting class and teaches the scientific principles and methods involved in water reclamation.

Before they visit the South Cross Bayou site, students are introduced to the topic of wastewater treatment through an animated video focusing on the role of bacteria. The video sets the tone for serious learning through humor in the light-hearted production. When they arrive at the site, students are introduced to the facility tour with a second short feature, a sequel to the classroom video. A third video was developed for the general public. Titled "Undissolved Mysteries," it features a detective/narrator who roams through the facility uncovering the mysteries of water reclamation.

After the video presentations, visitors board a tram that transports them through the 35-acre site. Hands-on investigation helps students and other visitors gain a better understanding of wastewater treatment processes.

Students test the wastewater at 2 different locations for dissolved oxygen, nitrates, nitrites, and total suspended solids. They compare their results with those from the professional on-site laboratory, as well as those from other high school groups, adding a competitive element to the tour. Students must each complete an exercise and observation notebook as they take the tour, creating accountability in meeting specific learning objectives.

Visitors to the facility develop a better understanding of the science involved in water reclamation, the role citizens play in managing limited water resources, the importance of clean water, and the range of career opportunities in wastewater treatment and management.

7.5.5 Yelm, Washington, A Reclaimed Water Success Story

The City of Yelm, Washington, boasts an \$11 million water reclamation facility that has gained statewide recognition and become a local attraction. Yelm recycles 200,000 gpd (760 m³/d) of water, with plans to eventually recycle 1 mgd (3,800 m³/d). The system has been producing Class A reclaimed water since its inception in August 2001; however, the jewel of the facility is an 8-acre (3-hectare) memorial park and fishing pond. At the park, a constructed wetlands system de-chlorinates, re-oxygenates, and further cleans, screens, and moves the water through a wetland park of several ponds, including a catch-and-release fishing pond stocked with rainbow trout. City representatives say the park has become a good place for fishing and viewing wildlife. There's even been a wedding held on site. The City also uses the reclaimed water for irrigation at a middle school and a number of churches. The water is also used to wash school buses and to supply a number of fire hydrants.

Yelm is actively promoting public awareness about reclaimed water. Twenty-five elementary and middle school students entered a city-sponsored contest to see who could come up with the most creative water reuse mascot. The winning mascot, designed by a fifth grader, was a purple pipe aptly named, "Mike the Pipe." Students and teachers then took the concept a step further and created an interactive skit using Mike the Pipe and other characters to talk about what can be done with water that is poured down a drain. Some of the other characters included, "Water Sprite," "Sledge," and "Little Bug."

The City of Yelm Water Reclamation Facility has won awards from the American Public Works Association, the Association of Washington Cities, and, in 2002, the Department of Ecology presented the City with an Environmental Excellence Award.

7.5.6 Gwinnett County, Georgia – Master Plan Update Authored by Public

Population and economic growth, as well as an extended drought, forced Gwinnett County, Georgia, to reassess its water strategy. While simultaneously building the 20-mgd North Advanced Water Reclamation Facility (NAWRF), the county also initiated a multi-stakeholder program to update its *Water and Wastewater Master Plan* in order to combat growing water problems.

The NAWRF is an 11-step reclamation facility that includes primary, secondary, and advanced treatment as well as a 20-mile (32-km) pipeline to discharge plant effluent to the Chattahoochee River. Unit processes at the plant include: clarifying tanks, biological treatment, membrane filters, sand and activated carbon filters, and ozone gas disinfection. During construction, projections led the County to begin plans to renovate the plant to double its capacity to 40 mgd (1,750 l/s).

As part of the multi-stakeholder program to update the master plan, the county created an Advisory Panel. The panel, created in 1996, had meetings facilitated by the Gwinnett County Department of Public Utilities (DPU) with assistance from an environmental consulting firm. Polls were held at public meetings to identify 7 categories of stakeholder groups (Hartley, 2003):

- Homeowner associations
- Business community
- Development interests
- Large water users
- Gwinnett County cities
- Environmental organizations
- Citizens-at-large

Representatives were selected from each of these stakeholder groups and were responsible for attending meetings and conveying information to and from their respective groups. Public meetings were held the first Tuesday of each month for 18 months. The following list of goals and objectives were developed by the Advisory Panel throughout the 18-month discourse (Hartley, 2003):

- Improve reliability of water and sewer system
- Develop strong maintenance and rehabilitation programs

- Protect public health and the environment
- Plan for water and sewer capacity proactively
- Minimize the negative impact of new facilities on neighborhoods and the environment
- Develop alternate water sources
- Pursue regional opportunities
- Manage water and wastewater demand
- Provide a high level of service at an optimum cost

One of the major items of dissent among the regulatory agencies, Gwinnett County, and members of “the public” was effluent disposal from the NAWRF. The original plant included a pipeline to discharge effluent to the Chattahoochee River; however, fears of low quality effluent and recent raw sewage spills and fish kills led many groups and individuals to be against discharge to the river. The second alternative was to discharge effluent to Lake Lanier, which feeds the local water treatment plant, in turn, a form of indirect potable reuse. And although the state did approve discharge into Lake Lanier, it is illegal in the State of Georgia to perform direct potable reuse (Hartley, 2003).

The Advisory Panel recommended the following items for water supply (Hartley, 2003):

- Preference for the continued use of Lake Lanier as a water supply source in the near-, mid-, and long-term
- Blended reuse was considered a secondary alternative in the long-term

The group created a second set of recommendations for wastewater (Hartley, 2003):

- Given the quality of treated wastewater effluent from the NAWRF, nonpotable reuse should be “pursued vigorously” through all time periods
- Continue to seek conversions from septic tanks to public wastewater treatment
- Discharge into the Chattahoochee River in the near-term was preferred, with a second option being discharge into Lake Lanier
- Increased preferences for blended reuse in reservoirs for the mid- and long-term planning horizons

These items were included in the update to the master plan that the Advisory Panel members “...actively wrote and edited...” (Hartley, 2003).

In addition to the creation of the Advisory Panel, Gwinnett County created a separate Citizen Advisory Board to oversee responsibilities at the NAWRF, especially proper operations and meeting effluent limits. This board was created in response to the concern that lower-standard effluent would have detrimental effects on the Chattahoochee River and Lake Lanier.

“While there were a few common members with the master planning process Advisory Panel, the Citizen Advisory Board is in independent group with a distinct role. It serves as a communication channel between the public and the utility. The Citizen Advisory Board controls its own \$50,000/year budget. The Citizen Advisory Board has spent the funds on sampling, technical review of plans and designs, and other oversight activities” (Hartley, 2003).

The Citizen Advisory Board has been successful in both facilitating communications with other citizens, as well as being instrumental in ensuring premium operations and maintenance at the NAWRF. Most recently they succeeded in adding a new resolution to include annual budgeting for the retraining of the operations and maintenance staff at the plant (Hartley, 2003).

7.5.7 AWWA Golf Course Reclaimed Water Market Assessment

In 1998, the AWWA Water Reuse Committee commissioned a study to survey golf course superintendents regarding their perceptions and experiences using reclaimed water. With the increasing need to turn to reclaimed water for non-domestic uses, the water industry was interested in determining if the existing systems providing reclaimed water to golf courses were satisfactory or needed improvement so that this information could be used by providers when developing future reclaimed water systems.

A survey creation group was formed with members of the USGA Green Section, certified golf course superintendents, and a member of the University of Nevada at Las Vegas (UNLV) research staff. This group developed a 37-question survey focused primarily on the technical aspects of water quality issues, irrigation system issues, management issues, provider issues, and the perceptions of golfers, superintendents, and the public.

The survey was beta tested in 2000 with the AWWA CA/NV Recycled Water Committee and the NWEA user sub-

committee of Reuse Nevada to ensure that the time commitment and survey content were appropriate. A website was built to disseminate the survey, providing a readily available place for soliciting input from superintendents across the nation. The website, www.gcrwa.com, was opened in September of 2000 and the necessary programming was completed to allow the survey data to be downloaded to a secure database so that the results could be evaluated.

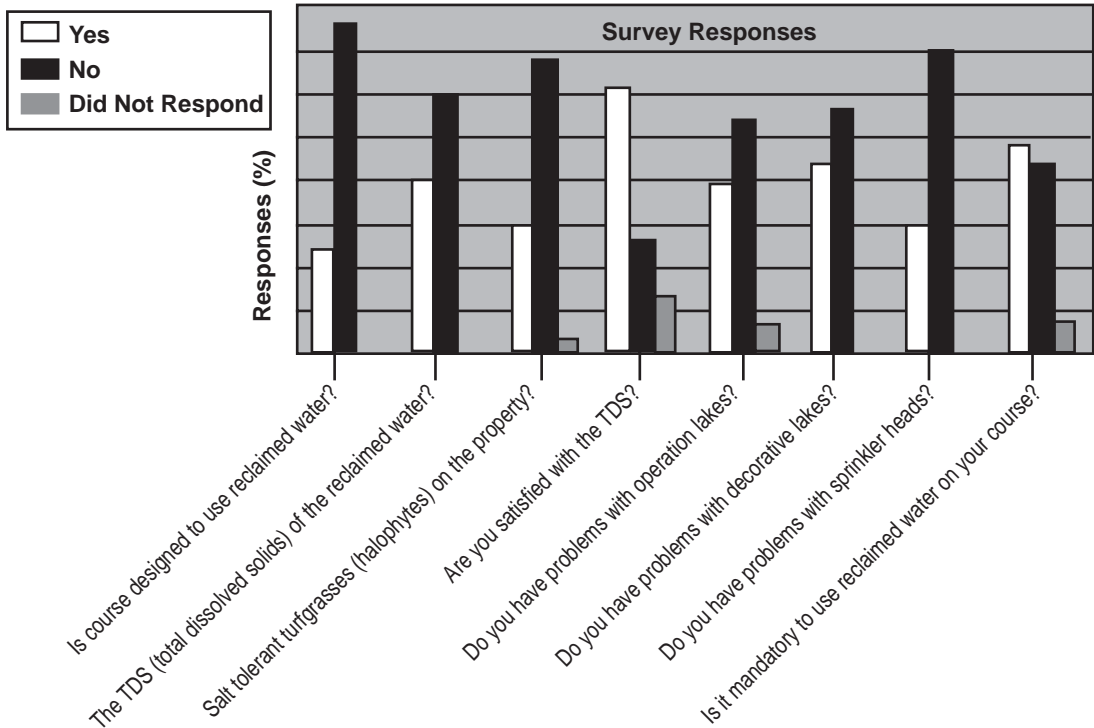
Since January 2003, data has been received from 15 states and British Columbia with the majority of the survey responses coming from Florida, Arizona, and Nevada. Knowing that the USGA list of effluent-using golf courses in 1994 numbered 220 and the number in Southern Nevada alone has grown from 5 to 17 since then, it is estimated that the number of golf courses in the U.S. that use reclaimed water might easily exceed 300 today. Based on this expected sample population, the most significant observation has been the slow response rate from golf course superintendents — only 88 have been received. Internet responses as of January 2003 numbered 62, while returns by fax or mail number 26, indicating that 30 percent of the superintendents either do not have access to the Internet or prefer to respond with hard copy.

The survey responses have come from private courses (47 percent) and public courses (53 percent). Most of the courses (78 percent) were standard 18-hole courses and ranged between 660 and 7,200 yards (600 and 6,580 meters) in length. About 55 percent of the courses use reclaimed water all or part of the time. The remaining 45 percent of the courses use potable, well, storm, canal, river water, or combinations thereof to irrigate their courses.

Significant to the intent of the survey, was the response regarding the opinions of golfers, nearby residents, and superintendents to the use of reclaimed water. Negative comments about reclaimed water appear to be limited to about 10 percent of each of the groups, with odors being the only repetitive comment. The overwhelming majority (90 percent) appears to be very positive and supportive of reclaimed water use. Algae, pondweeds, and odors were the 3 most troublesome problems for superintendents associated with both reclaimed water irrigation systems and aesthetic ponds.

Irrigation quantity and timing was most often influenced by turf color, followed by soil sampling and on-site weather stations. Total dissolve solids (TDS) is generally claimed to be a large concern with turf irrigation water, so it was interesting to find that only 31 percent of

Figure 7-5. Survey Responses



the survey respondents claimed to know what the actual TDS of their water was, yet 59 percent were either satisfied or dissatisfied. Satisfied outnumbered the dissatisfied by a ratio of 2 to 1. A graphical representation of the survey responses is presented in **Figure 7-5**.

7.6 References

Alpha Communications, Inc. 2001 *Water Reclamation Public Opinion Surveys*. Researched for: Clark County Sanitation District. Las Vegas, Nevada.

Curran, T.M. and S.K. Kiss. 1992. "Water Independence in Cape Coral: An Implementation Update." In: *Proceedings of Urban and Agricultural Water Reuse*, Water Environment Federation, Alexandria, Virginia.

Filice, F.V. 1996. "Using Public Opinion Surveys to Measure Public Acceptance of a Recycled Water Program – San Francisco, CA." *Water Reuse Conference Proceedings*. AWWA. Denver, Colorado.

Grosh, E.L., R.L. Metcalf, and D.H. Twachtmann. 2002. "Recognizing Reclaimed Water as a Valuable Resource: The City of Tampa's First Residential Reuse Project." *2002 WaterReuse Annual Symposium*, Orlando, Florida. September 8-11, 2002.

Grinnell, Gary K., and Ram G. Janga. 2003. "AWWA Golf Course Reclaimed Water Market Analysis." *2003 AWWA Annual Conference Proceedings*, Anaheim, California.

Hall, W.L. and A.R. Rubin. 2002. "Reclaimed Water: A Public Perception." WEFTEC 2002, *Proceedings of the 75th Annual Conference and Exposition*, Chicago, Illinois.

Hartley, Troy W. 2003. *Water Reuse: Understanding Public Perception and Participation*. Alexandria, Virginia: Water Environment Federation and IWA Publishing.

Kadvany, John, and Tracy Clinton. 2002. "A Decision Analysis Toolkit for Engineering and Science-Based Stakeholder Processes." WEFTEC 2002, *Proceedings of the 75th Annual Conference and Exposition*, Chicago, Illinois.

Sheikh, B., J. Kelly and P. MacLaggan 1996. "An Outreach Effort Aimed at Increasing Water Recycling in California." *Water Reuse Conference Proceedings*. AWWA. Denver, Colorado.